Waseem Abbas et al



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Research Article

PREVALENCE AND RISK FACTORS ASSOCIATED WITH DEVELOPMENT OF PRE-DIABETES AND DIABETES AND OUTCOMES FOR THEIR PREVENTION AMONG THE POPULATION WHO VISITS THE TERTIARY CARE HOSPITAL

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Abstract:

Introduction: As per International Diabetes federation about 415 million individuals that estimated to develop diabetes are diagnosed with diabetes and 318 million those have pre-diabetes will be at higher risk of developing the diabetes in future. **Methodology:** A cross sectional study with a total number of 325 patients with age between 25-64 years with abnormal blood glucose level was conducted. The participants of the study were classified into two categories depending upon their blood glucose and three categories each depending upon their BMI and blood pressure. The data was analyzed by dividing the participant into five different age group and the diabetes and pre-diabetes prevalence was assessed in these different age group including their gender difference.

Results: from 325 patients 171 diagnosed with Pre-diabetes with highest ratio among 30-40 years. 154 patients suffering from diabetes with most of the patients of 60 to 64 years age. From 325 patients 171 (101 male and 70 female) was diagnosed with pre-diabetes whereas 154 (92 male and 62 female) was suffering from diabetes. From the 171 and 154 who were diagnosed with pre-diabetes and diabetes 22 and 34 individual was smoker, 2 each involved in betel nut chewing, 81% and 82% with abdominal obesity respectively. Out of 154 individual diabetes 30% individual have normal blood pressure, 18% with prehypertension and remaining 52% of patients was suffering from hypertension.

Conclusion: Abdominal obesity is the main cause for developing the pre-diabetes and diabetes. The hypertension is more common in diabetic patients as compare to those with pre-diabetes. It has been recommended that there is an absolute need of awareness and education about the relationship of obesity and pre-diabetes and diabetes in order to decrease the number of diabetic population.

Keywords: Pre-Diabetes, Diabetes, Smoking, Obesity, Hypertension

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Waseem Abbas et al

INTRODUCTION:

Diabetes is considered as most common disease that affect the life of many people worldwide.(1,2) It has been estimated that by the International Diabetes federation that about 415 million individuals adults that estimated to develop diabetes are diagnosed with diabetes and 318 million those have pre-diabetes will be at higher risk of developing the diabetes in future (3). Hyperglycemia is considered as a major risk factor for the mortality and morbidity in patients who were either suffering from diabetes or not (4-7). However in Emergency Department the identification and management of hyperglycemia was quite insufficient (8).

The pre-diabetes that is the hyperglycemia but below the range of diabetes may develop in most of the patient who lead to type 2 diabetes later as an exhibiting sign (9). This is also known as impaired glucose tolerance (IGT) or impaired fasting glucose (IFT). Hyperglycemia but below the range of diabetes after eating is known as impaired glucose tolerance while hyperglycemia but below the range of diabetes after the period of fasting is known as impaired fasting glucose (IFT). People with IGT are at more risk for developing the type 2 diabetes. There are some evidence that patient with IGT cannot develop into type 2 diabetes by life style modification through proper diet and physical exercise in order to prevent the progression of diabetes (10).

Methodology:

Study Settings and Subjects:

A cross sectional study was conducted in outpatient department of a tertiary care hospital larkana. A total number of 325 patients was evaluated on the having age between 25-64 years. All the patients who were less than 25 years and more than 65 years are not included in this study. All the patients with normal blood glucose level and pregnant ladies are also excluded from the study.

Measurements, variable classification and analysis:

Patient's demographic data including age, education level, residence and life style were evaluated along with any behavioral risk factors. A portable device was used to check the blood glucose level of the patients. A glucometer was used to check the fasting blood glucose level of the patients by pricking their fingertips. The participants of the study were classified into two categories depending upon their blood

glucose level into pre-diabetic individual with fasting blood glucose level between 5.6 to 6.9 mmol/liter and the diabetic individuals having fasting blood glucose level of 7 mmol/liter or more. (11). The participants were also classified into 3 different groups on the basis of body mass index (BMI) into underweight or with normal weight individuals having BMI less than 18.5kg/m^2 or between 18.4 kg/m² to 24.9 kg/m², overweight individuals having BMI 25.0 kg/m²to 29.9 kg/m² and obese individuals having BMI greater than 30 kg/m^2 (12). The waist circumference and waist hip ratio is equal to or greater than 90 cm and 0.90 in male and equal to or greater than 80 cm and 0.85 for women respectively is called as abdominal obesity. (12). Blood pressure of the participants was also categorized into 3 groups the normal having with less than 120 mmHg and less than 80 mmHg systolic and diastolic respectively, prehypertension with 120 to 139 mmHg and 80 to 89 mmHg systolic and diastolic respectively and hypertension with equal to or more than140 mmHg and equal to or more than 89 mmHg systolic and diastolic respectively (13).

The data was analyzed by dividing the participant into five different age group between 25 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years and 60 to 64 years and the diabetes and pre-diabetes prevalence was assessed in these different age group including their gender difference. The glycemic status was also evaluated on the basis of their demographic data and body mass index and the blood pressure.

RESULTS:

A total of 325 patients visited the hospital, out of those 171 of different age group were as shown in table 1 suffering from Pre-diabetes. The ratio of the patients having age between 30 to 40 years was most as 78 patients of this age group were diagnosed with prediabetes as compare to those having age of 41 to 50 years 59, having age between 51 to 59 years 14 patients, having age between 25 to 29 years 11 patients and having age between 60 to 64 years 09 patients were diagnosed with pre-diabetes respectively. 154 patients who visited the hospital were suffering from diabetes, the ratio of the patients having age between 60 to 64 years was most as 58 patients of this age group were suffering from diabetes as compare to those having age of 51 to 59 years 53, having age between 41 to 50 years 22 patients, having age between 30 to 40 years 16 patients and having age between 25 to 29 years 05 patients were suffering from diabetes respectively.

Age Group	Pre-Diabetes	Percentage	Diabetes	Percentage	Cumulative
					Percentage
25 to 29 years	11	6%	5	3%	4%
30 to 40 years	78	46%	16	10%	29%
41 to 49 years	59	35%	22	14%	25%
50 to 59 years	14	8%	53	35%	21%
60 to 64 years	09	5%	58	38%	21%

Table 1 Prevalence of Diabetes and Pre-diabetes in different age group	Table 1	Prevalence	e of Diabetes	and Pre-	-diabetes i	in different	age group
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From 325 patients 171 (101 male and 70 female) was diagnosed with pre-diabetes whereas 154 (92 male and 62 female) was suffering from diabetes. The level of education of 70% of total population that was diagnosed with pre-diabetes and diabetes in proposed study was either under matriculation or uneducated and remaining 30% population was graduated. From the 171 who were diagnosed with pre-diabetes 22 individual was smoker, 2 peoples involved in betel nut chewing, 81% with abdominal obesity and 19% without abdominal obesity. Out of 171 individual with

pre-diabetes 89 individual have normal blood pressure, 66 with prehypertension and remaining 16 patients was suffering from hypertension. From the 154 who were suffering from diabetes 34 individual was smoker, 2 peoples involved in betel nut chewing, 127 with abdominal obesity and 27 without abdominal obesity. Out of 154 individual diabetes 30% individual have normal blood pressure, 18% with prehypertension and remaining 52% of patients was suffering from hypertension.

Risk Factors	Pre-diabetes	Diabetes	
Gender			
Male	101 (59%)	92 (60%)	
Female	70 (41%)	62 (40%)	
Level of Education	120 (70%)	108 (70%)	
Uneducated			
Level of education	51 (30%)	46 (30%)	
Educated			
Smoker	22 (13%)	34 (22%)	
Betel Nuts Chewer	2 (1%)	2 (1%)	
With Abdominal Obesity	139 (81%)	127 (82%)	
Without Abdominal Obesity	32 (19%)	27 (18%)	
Normal Blood Pressure	89 (52%)	46 (30%)	
Prehypertension	66 (38%)	28 (18)%	
Hypertension	16 (10%)	80 (52%)	

Table 2 Risk Factors associated with pre-diabetes and diabet
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In the proposed study the individual of 25 to 29 years age group, all 5 diabetic was obese while the 1(9%), 2 (18%) and 8 (73%) was with normal weight, overweight and obese respectively diagnosed with pre-diabetes. From 78 individual who were diagnosed with pre-diabetes among the age group of 30-40 years 1 was underweight, 4 with normal weight, 11 overweight and remaining 63 were obese and from 16 peoples who were suffering from diabetes among this age group 1 with normal weight, 2 overweight and remaining 13 patients were obese. The individual of 41 to 49 years age group 1(2%), 5 (8%) and 53 (90%) was with normal weight, overweight and obese respectively diagnosed with pre-diabetes whereas

from 22 patients who were suffering from diabetes 2 (9%), 3 (14%) and 17 (77%) with normal weight, overweight and obese respectively. From 14 individual who were diagnosed with pre-diabetes among the age group of 50-59 years 1 was underweight, 2 overweight and remaining 11 were obese and from 53 peoples who were suffering from diabetes among this age group 6 patients was underweight, 3 with normal weight, 5 overweight and remaining 39 patients were obese. The individual of 60 to 64 years age group 1(11%), 1 (11%) and 7 (78%) was with normal weight, overweight and obese respectively diagnosed with pre-diabetes whereas from 58 patients who were suffering from diabetes 8

(14%), 6 (10%), 4 (7%) and 40 (69%) with underweight, normal weight, overweight and obese respectively.

Age Group	BMI	Pre-Diabetes	Diabetes
25 to 29 years Underweight Normal weight Overweight Obese	Less than 18.5kg/m^2 $18.4 \text{to} 24.9 \text{kg/m}^2$ $25.0 \text{to} 29.9 \text{kg/m}^2$ Greater than 30kg/m^2	00 (0%) 1 (09%) 2 (18%) 8 (72%)	00 (0%) 00 (0%) 00 (0%) 5 (100%)
30 to 39 years Underweight Normal weight Overweight Obese	Less than 18.5kg/m^2 $18.4 \text{to} 24.9 \text{kg/m}^2$ $25.0 \text{to} 29.9 \text{kg/m}^2$ Greater than 30kg/m^2	1 (1%) 4 (5%) 10 (13%) 63 (81%)	00 (0%) 1 (6%) 2 (12%) 13 (82%)
41 to 50 years Underweight Normal weight Overweight Obese	Less than 18.5kg/m^2 $18.4 \text{to} 24.9 \text{kg/m}^2$ $25.0 \text{to} 29.9 \text{kg/m}^2$ Greater than 30kg/m^2	0 (0%) 1 (2%) 5 (8%) 53 (90%)	00 (0%) 2 (9%) 3 (14%) 17 (77%)
51 to 59 years Underweight Normal weight Overweight Obese	Less than 18.5kg/m^2 $18.4 \text{to} 24.9 \text{kg/m}^2$ $25.0 \text{to} 29.9 \text{kg/m}^2$ Greater than 30kg/m^2	1 (7%) 00 (0%) 2 (14%) 11 (79)%	6 (11%) 3 (6%) 5 (9%) 39 (74%)
60 to 64 years Underweight Normal weight Overweight Obese	Less than 18.5kg/m^2 $18.4 \text{to} 24.9 \text{kg/m}^2$ $25.0 \text{to} 29.9 \text{kg/m}^2$ Greater than 30kg/m^2	0 (0%) 1 (11%) 1 (11%) 7 (78%)	8 (14%) 6 (10%) 4 (7%) 40 (69%)

Table 3 BMI and Pre-Diabetes and Diabetes ratio among different age gro	ups
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Waseem Abbas et al

DISCUSSION:

The prevalence of diabetes is most common concern currently. It has been estimated that 300 million people will develop diabetes in 2025 worldwide (14). Our study will observe the pre-diabetes and diabetes prevalence along with associated risk factor which will help to reduce the conversion and further occurrence of pre-diabetes into diabetes. A total of 325 patients visited the hospital, out of those 171 of different age group were suffering from Pre-diabetes. The ratio of the patients having age between 30 to 40 years was most as 78 patients of this age group followed by of 41 to 50 years 59, 51 to 59 years 14 patients, 25 to 29 vears 11 patients and having age between 60 to 64 years 09 patients were diagnosed with pre-diabetes respectively. Out of 154 patients who visited the hospital were suffering from diabetes, the ratio of the patients having age between 60 to 64 years was most as 58 followed by 51 to 59 years 53, 41 to 50 years 22 patients, 30 to 40 years 16 patients and having age between 25 to 29 years 05 patients were suffering from diabetes respectively. In our study it has been observed that the diabetes and pre-diabetes prevalence is more in male (101 pre-diabetic and 92 diabetic) as compare to female (70 pre-diabetic and 62 diabetic) which is consistent with other studies about high prevalence of diabetes in male compare to female (15-18). The level of education of 70% of total population that was diagnosed with pre-diabetes and diabetes in proposed study was either under matriculation or uneducated and remaining 30% population was graduated that determine the significant association between prediabetes and diabetes with level of education as compare to other studies in china (19) which shows the high occurrence of diabetes in graduate, this difference is particularly related with literacy difference between two countries. From the 171 who were diagnosed with pre-diabetes 22 individual was smoker and out of 154 who were suffering from diabetes 34 individual was smoker did not show any significant association with pre-diabetes and diabetes as compare to other study which indicating a significant association between diabetes and smoking (20). In proposed study it has been observed that abdominal obesity measured with BMI and WC is the main concern for developing the pre-diabetes and diabetes as 81% and 82% of the total population under proposed study was suffering from pre-diabetes and diabetes respectively as observed through different literature that is also supported by different studies that the obesity is more common in male as compare to female (19, 21-23). It has been observed in proposed study that the prevalence of prediabetes is most common in people having age group of 30-39 years and among them 81% was obese individual. Out of 171 individual with pre-diabetes 52% individual have normal blood pressure, 38% with prehypertension and remaining 10% patients was suffering from hypertension which does not show any significant association between pre-diabetes and hypertension. Out of 154 individual diabetes 30% individual have normal blood pressure, 18% with prehypertension and remaining 52% of patients was suffering from hypertension which is also supported by another study (24).

CONCLUSION:

It was concluded that the prevalence of pre-diabetes is very common in the age group of 30-39 years and 40-50 years. It was also concluded that there is no any significant relation with smoking and pre-diabetes or diabetes. Abdominal obesity is the main cause for developing the pre-diabetes and diabetes. As per prediction of Asian diabetes association the total number of diabetic population was 5.2 million in Pakistan and it will be 13.9 million people will develop diabetes by 2030 (25). The hypertension is more common in diabetic patients as compare to those with pre-diabetes. It has been recommended that there is an absolute need of awareness and education about the relationship of obesity and pre-diabetes and diabetes in order to decrease the number of diabetic population by properly monitoring and decreasing their weight among pre-diabetic and non-diabetic population.

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